What is claimed is:

1. A system comprising:

a source of substantially spin-polarized electrons; and

a medium which interacts with the spin-polarized electrons, the medium including a spin-dependent quantum well and a layer of semi-conductor material capable of emitting photons.

2. The system of claim 1, wherein the layer of semi-conductor material comprises a layer of N-type semi-conductor and a layer of P-type semi-conductor coupled so as to form a P-N junction.

3. The system of claim 2, wherein the P-N junction comprises an electron excited light emitting structure.

4. The system of claim 3, wherein the layer of semi-conductor material comprises Gallium-Arsenic (GaAs).

5. The system of claim 4, wherein the spin-dependent quantum well is substantially opaque to the photons emitted, during operation, by the layer of semi-conductor material.

6. The system of claim 1, wherein the spin-dependent quantum well comprises a layer of layer of magnetic material sandwiched between a first and second layers of spin mirror materials.

7. The system of claim 6, further including:

a first layer of a electrically conductive material between the first layer of spin mirror material and the layer of hard magnetic material; and,

a second layer of electrically conductive material below the layer of semi-conductor material.

8. The system of claim 7, wherein the second layer of electrically conductive material is substantially thin to allow photons emitted, during operation, by the layer of semi-conductor material to pass through the second layer of electrically conductive material.

9. The system of claim 7, wherein the second layer of electrically conductive material, at least partially, reflects the photons emitted, during operation, by the semi-conductor material.

10. A method for reading the spin state of a magnetic domain comprising:

directing at the magnetic domain a beam of electrons substantially polarized in a particular spin state; and

detecting the light emission state of a semi-conductor layer of the magnetic domain.

11. The method of claim 10, wherein detecting the light emission state comprises capturing at least a portion of the emitted photons utilizing a sensitive photo-detector.

12. The method of claim 10, further comprising determining the state of the magnetic domain, based in, part upon the light emission state.

13. The method of claim 12, wherein determining the state of the magnetic domain comprises comparing the spin state of the beam of electrons to the light emission state of the semi-conductor layer.

14. The method of claim 12, further comprising trapping a portion of the beam in the magnetic domain.

15. The method of claim 14, wherein determining the state of the magnetic domain comprises determining what the state of the magnetic domain was prior to trapping a portion of the beam in the magnetic domain.

16. A system for reading data comprising:

a source of spin polarized electrons;

a storage medium disposed a selected distance from the source and having a plurality of storage locations, each storage location including a magnetic material and a layer of semi-conductor material capable of emitting photons; and

a photo-detector to detect the emitted photons.

17. The system of claim 16, wherein the magnetic material of the storage location includes a spin-dependent quantum well.

18. The system of claim 16, wherein the layer semi-conductor material of the storage location includes a P-N junction.

19. The system of claim 16, wherein the layer semi-conductor material of the storage location includes Gallium-Arsenic (GaAs).

20: The system of claim 16, further comprising a vacuum housing.

21: The system of claim 20, wherein the vacuum housing is at least partially reflective, so as to facilitate the integration of the emitted photons.

22: The system of claim 16, wherein the magnetic material of the storage location is substantially opaque to the photons emitted, during operation, by the layer of semi-conductor material.

23. A storage structure comprising:

an array of magnetic locations, each magnetic location including a hard magnetic material sandwiched in between a first and second layer of a spin-mirror material and a layer of semi-conductor material.

24. The storage structure of claim 23, wherein the layer of semi-conductor material includes a P-N junction.

25. The storage structure of claim 24, wherein the P-N junction comprises an electron excited light emitting structure.

26. The storage structure of claim 23, wherein the layer of semi-conductor material includes a direct-band semiconductor.

27. The storage structure of claim 26, wherein the layer of semi-conductor material includes Gallium-Arsenic (GaAs).

28. The storage structure of claim 23, wherein each magnetic location further includes a layer of electrically conductive non-magnetic metal.

29. The storage structure of claim 28, wherein the layer of electrically conductive non-magnetic metal is substantially thin to allow the photons emitted, during operation, by the

layer of semi-conductor material to substantially pass through the conductive, non-magnetic metal.

30. The storage structure of claim 23, wherein the layer of hard magnetic material and the first and second layer of a spin-mirror material are substantially opaque to the photons emitted, during operation, by the layer of semi-conductor material.